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A. Kurkov

The stability, simplicity of design and maneuverability of sleds driven by aircraft propellers make the aerosled an ideal vehicle for winter communications, particularly in areas where the road network is poorly developed.

For greatest stability, the gross weight of the fully loaded sled must not exceed 15 kilograms per horsepower of engine. Therefore, the light single-seater sleds which, with the driver, weigh 100 kilograms, must have approximately a 6.7-horsepower engine. The larger sleds, such as the MKL-16, equipped with 100-horsepower engines, have a gross weight of 1,500 kilograms.

The engines vary in design from the small motorcycle type to aircraft types. The majority of prewar transport aerosleds were equipped with the M-11 aircraft engine. At the present time, automobile engines are being widely used. They are installed in many types of aerosleds, such as the GATT-5, A-3 and others. Motorcycle and motorboat engines have been found particularly practical for sporting and other small sleds, since during the winter they cannot be used for their designated purposes.

The aerosleds have an extremely simple power unit in which the number of crankshaft revolutions corresponds to the most efficient number of propeller revolutions, which is 1,400 - 2,000 revolutions per minute. In this case the airscrew is attached directly to the engine shaft. The majority of motorcycle engines have a considerably greater number of revolutions (3,000 - 5,000 revolutions per minute). In such engines it is necessary to install a special mechanism for reducing the number of propeller revolutions. The simplest device for this purpose is the chain drive with a chain gear. In this case, the diameter of the chain gear which is attached to the engine shaft must be smaller than the secondary chain gear.

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Air screws may be made from either wood or metal. Metal air screws have several advantages over those made from wood. They are considerably more rigid and have greater efficiency.

For propellers of more simple design, the blades are punched out of sheet metal and their edges are ground. Blades are assembled and bolted to the steel boss.

In order to assure high stability, the surface area of the skis must be sufficiently large. It has been established that the load of the traveling weight of the machine on one square meter of supporting surface must not exceed 400 - 550 kilograms. For example, the surface of all skis on an aerosled having a weight of about 300 kilograms must not be less than 0.54 - 0.75 square meters.

Until recently the three-ski aerosled, steered by the single front ski, was most prevalent. However, the four-ski aerosled has greater stability and a greater load capacity. In such sleds all four skis can be controlled, thus assuring greater maneuverability.

Light sporting sleds (about 100 kilograms) are usually of the three-ski type. Regular hunters' skis may be used for these sleds. However, special skis must be used for heavier sleds. Skis may be made either from wood or metal. Wooden skis can be made from fine-grained plywood or ash boards. Metal skis are more durable and lighter than wooden ones. Wooden skis frequently have metal edges made of stainless steel. For stability when traveling on hard snow or ice, metal flanges (ugo'niki-podrezy) are fastened to the bottom surfaces of the skis.

A serious deficiency in most aerosleds is the lack of an effective brake assembly. Generally, the brake works as follows: the driver depresses the brake pedal which pushes a brakeshaft down from the end of the skis. As these shafts plow through the snow, they brake the motion of the sled. However, on soft snow or steep inclines, this braking action is insufficient.

A unit for reversing the rotation of the air screw promises to be an effective method of braking. During World War II, the drivers of sleds resorted to various improvisations. At steep descents, they turned the sled backwards and descended carefully, using the air screw thrust as a brake.

With the exception of light sporting aerosleds and sleds for special purposes nearly all aerosleds in the USSR are closed, streamlined cabins set on skis and equipped with spring shock absorbers.

The light sporting aerosleds are frequently called "winter motorcycles," because of the similarity in construction, high stability and because they do not require special roads. Such sleds can be used not only for sports, but also for training drivers, as a means of communication, and as a means by which political agitators may reach remote regions.

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